

Description

The invention relates to a control device of a printing machine, having a control console composed of control elements for inputting instructions and a display
5 device for status display.

FR-A 2 450 305 has disclosed a programme control for a washing machine. In order to carry out the presett-
ing of the washing machine, a multiplicity of selection
10 keys are provided which are assigned to a corresponding
number of functions of the washing machine. For example,
one of these selection switches serves to select a
specific wash programme, another serves to select the
desired spinning speed. This means that for a
multiplicity of functions to be carried out a
15 corresponding number of selection keys has to be provided
which naturally constitutes a considerable outlay.
Furthermore, the programme control preset in FR-A 2 450
305 only serves to preset a washing machine - subsequent
changes to individual functions are not possible.

20 In GB-A 2 098 286 a device for controlling a
washing machine is described. For this, two groups of
control elements are provided, presettings relating to
the washing to be treated being made by the operator by
means of a second group of control elements. Subse-
25 quently, an optimum setting of the elements of a first
group of control elements takes place with computer
control. This optimum setting which is determined by the
computer is indicated visually via display elements.
Here, the operator is provided with the possibility of
30 modifying the displayed settings as desired. For this
purpose, a corresponding number of further control
elements are provided.

FR-A 2 098 065 is also concerned with the preset-
ting of a washing machine. Each individual function of
35 the washing machine is assigned in each case a
corresponding selection key. The preset data cannot be
subsequently corrected.

The connection of subprocesses during process automation is described in the book "Prozeßautomatisierung I" (Process Automation I), R. Lauber, Springer Verlag Berlin 1976, pages 13 to 14. A central process computer monitors, open-loop controls and closed-loop controls the various individual systems partially or completely with programme control. The individual subprocesses are connected to one another via the process computer.

10 A device for inking control of a printing machine has been disclosed in the company information of HEIDELBERGER DRUCKMASCHINEN AG (Heidelberg Printing Machines), "Heidelberger Nachrichten 3/40" (Heidelberg News). The system presented in this publication under the name CPC 1 contains a control console for inking control in a printing machine in which ink metering elements can be adjusted via control elements. The positions of these ink metering elements are indicated on an LED display. In a printing machine, but also in other types of machines, 20 for example machine tools, there is however a large number of different machine components which have to be set or adjusted before the machine is started up or even during the operation of the machine. For example, a number of actuation elements are present which actuate a specific element of a component. Hitherto, it has been customary to provide a switching console for setting or adjusting and for displaying the setting or adjustment, in which console a multiplicity of keys was provided and each key was capable of carrying out a specific actuation instruction. It is clear that especially in very complex machines with a multiplicity of printing units and assemblies such switching consoles become very large and unmanageable and thus make control more difficult.

35 The invention is based on the object of providing a control device of a printing machine in which simple, manageable control, operation and monitoring of the printing machine is achieved by means of multiple assignment of control elements to a control console.

This object is achieved in that several groups of control elements are provided, in that control elements of the first group have a fixed correlation with freely selectable main groups of the printing machine, in that
5 control elements of the second group are correlated with selectable components, to be controlled, of the main group of the printing machine selected by control elements of the first group, in that control elements of the third group are designed as function generators for the
10 input of switching and/or setting instructions in such a way that a corresponding function is triggered in the components selected by control elements of the second group, and in that the selected correlation of control elements with specific main groups, components and/or
15 function generators is indicated on the display device as corresponding graphic symbols.

The essential advantage of this structure of an input and display device is the small number of keys or input elements whose assignment is multiple and is
20 performed in accordance with a selection by the first group of control elements on the basis of a display. In addition, it can be directly represented by means of the display whether a specific function of the machine has been switched on or switched off or has a specific value.
25 Thus, it is possible for example for the display to represent, for example graphically and/or numerically, a quantity of a setting path.

It is advantageous that a display device is provided with which the assignment of the control
30 elements is graphically displayed. In this way, the display becomes independent of language. The symbols are easy to recognise and prevent incorrect operation due to textual misunderstandings. It is also possible to display an additional image which shows the entire component of
35 the machine or even the entire machine and makes it easier for the operator to correlate the instructions to be executed to the respective component or to the machine. The display of these components or of the

machine is controlled by the selection of control elements, this meant for example that when a key of the first group of control elements is actuated this selected main component is represented whilst after a key of the second group of control elements is actuated the component which has now been selected is represented as the entire image.

A further development of the invention provides for a function input which has been brought about by an instruction to be carried out immediately or only preselected and then carried out when for example a further instruction is given or the machine is in a specific operating state. This so-called preselection of functions is for example useful when the machine is set before starting and the presetting is only to be carried out once the operation of the machine has started.

It is to be considered a further advantage in a further development that even in the event of the display failing it is still possible to operate the machine since the possible key assignments are permanently specified and assignment of the keys is defined by actuating specific keys, and this assignment can be determined either from knowledge of the assignment scheme or from additional aids such as for example templates or the like and thus it is made possible for the machine to be operated.

Specific processes can proceed automatically in a machine without external control. For this purpose, in a further development of the invention there is provision for additional control elements to be arranged on the control device with which these processes can be triggered.

A further design of the invention provides for more than one component to be illustrated so that it is possible for a controller to monitor the set functions of more than one component simultaneously. There is also provision not only to monitor these functions but also simultaneously to permit switching or setting

instructions to act on more than one component. If the device is used with a printing machine, it is of particular advantage if the second group of control elements or even a group of control elements connected in parallel with the second group is correlated with the individual printing units of the printing machine. In this way, each printing unit can be selected individually as a component or else in its entirety.

The display of the correlation of the key assignment with specific components of the machine takes place in one embodiment of the invention in such a way that the representation of the groups of control elements are [sic] arranged on a display or at the outer edges of a display and the area of the display adjacent to the respective control element or key indicates the respective function or mode of operation or correlation of the control element.

In a further development of the invention, there is provision for the display to be provided simultaneously for service monitoring, i.e. for representing the correct operation of the components or further functions, in order to make servicing the machine easier.

If a printing machine is provided with the device, it is advantageous to arrange this device centrally in the direct vicinity of the printing machine. In addition to this centrally arranged device, an operating console or a display device can advantageously be arranged on each printing unit or on the paper delivery element or the paper input element, with which console or device control or monitoring can be performed if the operator requires this at the component located there. For example, it is expedient to arrange a display at the paper feed of a sheet printing machine, i.e. at the sheet feeder, by means of which display faulty sheets or other faults and the printing speed can be displayed. In addition, it is possible at these operating points to change the printing speed and to perform for example a

brief overdamping or underdamping using the offset printing method and to perform other control interventions.

It is known to be customary to provide on a printing machine an inking and/or register control console as a unit set up separately from the printing machine. The control device according to the invention can be incorporated in this device, all the control interventions which do not concern inking or register control being performed on the printing machine with this control device.

On the other hand, there is also the possibility of performing control interventions on both devices. Here, according to a further development of the invention there is provision for control interventions which are performed on one of the devices to be allowed to affect the other device. In this way, overlapping in the control or duplicated controls are avoided.

It is expedient to pass these control interventions on to the central device so that these control interventions can be recognised there.

Further advantageous embodiments of the invention are contained in the subsequent description of the figures.

The invention is explained in greater detail below with reference to exemplary embodiments. In the drawings:

- Fig. 1 shows the diagrammatic design of a control device for a printing machine,
- Fig. 2 shows the design of a control device for a sheet printing machine,
- Fig. 3 shows a listing of the control possibilities of the control device shown in Fig. 2,
- Fig. 3a shows a sequence diagram for the control of the control device shown in Fig. 2,
- Fig. 4 shows an example for the control for the delivery unit of a sheet printing machine,

Fig. 5 shows an example for displaying the paper conveying system in a sheet printing machine,

Fig. 6 shows an example for the display of all the printing units of a sheet printing machine.

5 Fig. 1 shows a control and display device which is arranged on a control console of a printing machine. A display 1 is provided, the control elements are arranged in groups, a first group of control elements 2 is arranged above the display, a second group of control
10 elements 3 is arranged to the side of the display and a third group of control elements 4 is arranged below the display.

 Various main groups A, B, C corresponding to the figures 6, 7, 8 or the machine as a whole 5 can be
15 selected with the group of control elements 2. Various components of the respectively selected main group or of the machine as a whole can be selected with the control elements 3 whilst the control, for example the switching on and off of the selected component, is performed with
20 the control elements 4 or various functions of the selected component are controlled. An input field 25 arranged to the right of the display 1 serves for numerically inputting setting data, data relating to the number of items or the like. Using the display mode keys 56 the display mode in which inputs are to be performed is
25 selected. In a first input mode (56, key A), the inputs are transferred directly to the machine whilst in a second input mode (56, key B) the inputs are first stored and transferred from the machine at a later time. In
30 addition, it is also possible by means of a key 9 to perform a setting to a specific setting value at a specific component. In an example, control of a specific component or of any component will clarify the mode of operation of the control device.

35 Initially, the main group in which a change is to be performed is selected at the control elements 2. This takes place by actuating, for example, the control element 7. The control elements can be constructed as keys,

of course it is also possible to construct the control elements as contactless sensors or the like. After the control element 7 is actuated, the control elements 3 are assigned to specific components of the selected main group via the display 1, i.e. the component X can be selected via the key 10, the component Y via key 11, component Z of the selected main group via key 12. In this example, the keys 13 and 14 are not assigned to components.

10 By selecting the component Y on the basis of actuation of the key 11, this component appears as a diagrammatic representation 15 on the display 1. At the same time, in this diagrammatic representation motors, actuation elements or the like (I, II, III, IV) are graphically represented as so-called function elements. At the same time, the control elements 4 are assigned to these function elements (I, II, III, IV), specifically by the lighting up of the corresponding symbols at the points in the display 1 assigned to the control elements 4. It is now possible to switch on the function element 18 (IV) with the control elements 4, for example with the key 20. The switched-on operating state is indicated by the function element 18 (IV) lighting up. Likewise, it is indicated which function elements have already been switched on, this is also effected by the lighting up of the represented function element, for example of the function element 19 (I).

It is also possible to adjust the values of a function element via the key 9 which is constructed as a plus/minus key. In the example shown, the function element I (19) which is indicated above the key 9 or the function key 23 can be set or adjusted. The magnitude of the setting value is indicated visually via a graphic representation with a value indicator 24, for example this value indicator displays a speed of revolution of the function element 1 which contains a motor, the size of the indicated speed of revolution being represented in relation to the maximum speed of revolution or to a

nominal speed of revolution. Of course, it is possible to assign a key 9 to each function key 20-23. This is then required if it is necessary to perform settings to specific values for several or all of the function elements. However, if it is only necessary to switch on or off one function element a single function key is completely adequate.

In Fig. 2, the control and display console for controlling a sheet printing machine is illustrated and is described in greater detail below. The groups of control elements 2, 3 and 4 and the display 1 and keys 9, 9' are also present here. In addition, this device also shows an input field for the numerical input 25, a key for stopping the machine, an emergency shut-off key, two further groups of keys 28, 29 and a key switch 55. The key group 28 serves for selecting the individual printing units of the printing machine and is marked in each case with the printing colours or with other labels of the individual printing units.

The key group 29 contains a preselection key 30, an actual value key 31, a service key 34 and a fault key 35. Using the preselection key 29 it is possible only to preselect specific function inputs, these preselected functions not being switched on until the machine starts or is in a specific operating state. If, on the other hand, the actual value key 29 is actuated, the transfer then occurs immediately when the respective function is input, i.e. the input instruction is immediately executed. By actuating the service key 34, the switching states of the individual components can be tested.

Main groups of the printing machine can be selected via the control elements 2: key 36 designates the machine as a whole. After this key is actuated, components of the entire machine such as the paper conveying system, suction air, blowing air, cooling device or the function of the cooling can be controlled. With the key 37, the sheet delivery element as main groups [sic] is selected, using the key 38 the printing

units are selected as a machine element and using the key 39 the sheet feed is selected as a machine element.

In order to explain the control or sequence of control steps for the control of the sheet printing machine, a listing of the control possibilities is illustrated in Fig. 3. In a first column, the main groups or machine elements are listed with their designations as on the control elements 2 in Fig. 2. When one of the control elements 2 is actuated the control elements 3 are assigned to the components which are shown in column 2. The selection of one of these components, by actuating one of the control elements 3, brings about an assignment of the function keys (control elements 4), by the function elements shown in column 3 in Fig. 3. In the case of the function elements "set copy counter", "preset number of prints" and "suction roller" and "damping system" there is also the possibility of performing a setting to a specific value via the keys 9, 9'. Thus, by actuating the key 9' in the function "set copy counter" a specific number of copies which are then processed by the machine can be predetermined. Likewise, by means of the key 9 a specific printing speed can be predetermined. With the function element suction roller, a speed of revolution setting of the suction roller is performed via the key 9. In the case of the damping function element, a speed of revolution setting of the immersion roller of the damping unit is performed via the key 9.

The process diagram shown in Fig. 3a is intended to clarify the operation scheme on the control device or the control console. After the control console is started up, i.e. after the start 40, one of the main groups or the machine as a whole is selected via the control elements 2. After this selection, by actuating the key 30 or 31, the instruction is issued to pass on immediately the subsequent function input to the machine (actual value key 31) or only to store the subsequent function value input and then to carry out this function setting at a specific time, for example when the machine starts.

This temporary storage requires the preselection key 30 to be actuated. After this action is performed, a component which is correlated to the control elements 3, listed in column 2 of Fig. 3, is selected and/or an
5 adjustment is performed via the keys 9, 9'. If the actual value key 31 has been actuated, the executed functions are immediately accepted by the printing machine; if the preselection key 30 has been actuated, the executed functions are buffered in a memory in the control console
10 and only transferred to the printing machine after specific criteria are fulfilled.

In Fig. 4, an example of the control for the delivery unit of a sheet printing machine is shown. In order to control functions on the delivery unit it is
15 initially necessary to actuate the key 37 for the control elements 2. Subsequently, the top key of the control elements 3 is assigned the digit 1, this means that the delivery unit only contains a single group of components. This group of components is indicated in a diagrammatic
20 representation 15. This diagrammatic illustration contains a representation of the delivery unit and, arranged above this, the function elements suction roller 41, delivery ventilator 42, dusting device 43, infrared dryer 44, blower for delivery unit sprocket wheel 45. By
25 actuating the preselection key 30, it is determined that a subsequent actuation of one of the function keys of the control elements 4 is first stored. By means of the control elements 4, one of the function elements can now be switched on or off. Switching on of the function
30 elements is signalled by the corresponding function element lighting up in the diagrammatic representation 15. In addition, it is possible to set the speed of revolution of the suction roller 41 via the key 9. The preset speed of revolution is indicated via the graphic
35 display 46 and via an additional numerical display 47.

Fig. 5 shows an example for the display of the paper conveying system in a sheet printing machine. Here, by selecting the key 36, the machine as a whole,

correlation of the control elements 3 is performed by means of the symbols for paper conveying system 48, suction air 49, blower air 50, cooling system 51, shown in the display 1. By actuating the actual value key 31 and subsequently the key 52 which is correlated to the paper conveying system 48, the data required for the paper conveying system are shown on the display 1 in an alphanumeric representation. Thus, the display total (_{tot}) shows all the copies produced by the printing machine, the display printing unit total () shows the prints to be produced per run, the display (V) shows the speed of the machine in prints per hour and the display total (1, 2, 3) shows the daily output in numbers of prints. The specific function elements can be switched on and off via the control elements 4 whose correlation in the display 1 is determined by means of the graphic symbols located above the control elements, in addition the copy counter can be set via the key 9' and the speed of the machine can be preset via the key 9.

In Fig. 6, the display of all the printing units of a sheet printing machine is shown in an example. By actuating the key 37 of the control elements 2, the control elements 3 are correlated to the printing units 1-7 by the display of the digits 1-7 in the display 1. Now, the preselection key 30 or the actual value key 31 can be actuated. In order to display all the printing units, a total key 52 is subsequently actuated, after which all the function elements of the individual printing units appear in the display 1, it being indicated by the lighting up of the function elements of the printing units 2-6 that said elements are switched on. By actuating one of the function keys of the control elements 4, all the function elements correlated with these function keys are switched for this total display. Via the key 9' it is possible to change the speed of revolution settings of the damping system, i.e. of the immersion rollers which are graphically and alphanumerically represented (53, 54). All the printing units are also changed here

simultaneously and uniformly.

Of course, it is also possible to set or to operate an individual printing unit within the total representation. For this purpose, the key of the control elements 3 correlated with the appropriate printing unit is actuated. Subsequently, only this respective printing unit or the function elements of this printing unit are indicated and setting can then only be performed for this printing unit. This printing unit can also be represented individually. This possibility of representing a single printing unit from a total representation can be described as a detail display and, after an initial general item of information on all the printing units has been acquired, permits more precise information relating to a specific selected printing unit to be obtained.

In addition to such a control console which permits a printing machine to be controlled centrally, it is also possible to provide decentralised control devices or display devices at specific locations in the printing machine. Such a location is for example the feeder unit or else the delivery unit. Here, in each case there are displays which indicate the speed of the printing machine, the correct feeding of the sheet and the like, in addition, control elements are arranged here which permit a machine stop, an emergency shut-off, a print initiation, a speed control, and switching on and off of the paper conveying system. Furthermore, various reporting devices are provided for indicating faults. In addition, it is expedient to install on each printing unit a control point with which the clamping of a printing plate can be controlled or else the machine can be driven forwards or backwards or at creeping pace with short pulses.

If a function element is connected to one of the decentralised control points, this switching over of course also acts on the centralised control console so that the current state of the machine is always indicated on the control console.

LIST OF PARTS

	1	Display
	2	Control elements
	3	Control elements
5	4	Control elements
	5	Machine as a whole
	6	Main group
	7	Main group
	8	Main group
10	9/9'	Key +/-
	10	Key
	11	Key
	12	Key
	13	Key
15	14	Key
	15	Diagrammatic representation
	16	Function element
	17	Function element
	18	Function element
20	19	Function element
	20	Function key
	21	Function key
	22	Function key
	23	Function key
25	24	Value indicator
	25	Input field
	26	Machine stop key
	27	Emergency shut-off key
	28	Group of keys
30	29	Group of keys
	30	Preselection key
	31	Actual value key
	34	Service key
	35	Fault key
35	36	Machine as a whole
	37	Delivery unit
	38	Printing units

	39	Feeder unit
	40	Start
	41	Suction roller
	42	Delivery blower
5	43	Dusting device
	44	Infrared dryer
	45	Blower for delivery unit sprocket wheel
	46	Speed of revolution indicator
	47	Speed of revolution indicator
10	48	Paper conveying system
	49	Suction air
	50	Blower air
	51	Cooling system
	52	Σ Key
15	53	Speed of revolution of damping system
	54	Speed of revolution of damping system
	55	Key switch
	56	Display mode key



Claims

1. Control device of a printing machine, having a control console composed of control elements (2, 3, 4) for inputting instructions and a display device (1) for status display, characterised in that several groups (2, 3, 4) of control elements are provided, in that control elements (5, 6, 7, 8) of the first group (2) have a fixed correlation with freely selectable main groups of the printing machine, in that control elements (10, 11, 12, 13, 14) of the second group (3) are correlated with selectable components, to be controlled, of the main group of the printing machine selected by control elements of the first group (2), in that control elements (20, 21, 22, 23) of the third group are designed as function generators for the input of switching and/or setting instructions in such a way that an appropriate function is triggered in the components selected by control elements of the second group (3), and in that the selected correlation of control elements with specific main groups, components and/or function generators is indicated on the display device (1) as appropriate graphic symbols.
2. Device according to Claim 1, characterised in that the input mode is determined with further control elements (56) in such a way that an input switching and/or setting instruction effects the switching or setting of the specific functions directly or only in a specific state of operation of the printing machine.
3. Device according to Claim 1 or 2, characterised in that by means of the display device (1) the printing machine as a whole or components thereof are graphically illustrated.
4. Device according to Claim 3, characterised in that the display of the printing machine as a whole or of its components by means of the control elements is designed such that each kind of control to be executed is indicated by the appropriate display.



5. Device according to one or more of the preceding claims, characterised in that control of the machine is also possible in the event of failure of the display device, due to the preselectable and fixed correlation of the control elements.
6. Device according to one or more of the preceding claims, characterised in that additional control elements in addition to the control elements are provided with which autonomous processes in the printing machine are triggered.
7. Device according to one or more of the preceding claims, characterised in that at least one control element (52) is provided with which several components are displayed simultaneously.
8. Device according to one or more of the preceding claims, characterised in that at least one control element is provided with which a switching and/or setting instruction becomes effective simultaneously in a plurality of components.
9. Device according to Claim 1, characterised in that the groups of control elements (2, 3, 4) on the outsides of the display device are arranged in the form of a two-dimensional display (1) in such a way that on the display (1) the correlation of the control elements with the components can be seen through a spatial correlation of graphic symbols, which can be indicated on the display, with the control elements.
10. Device according to Claim 9, characterised in that the correlation of the control element is selected in such a way that the actuation of the control elements to be executed consecutively takes place by way of an arc-like approach in a specific direction around the display (1).
11. Device according to one or more of the preceding claims, characterised in that at least one control element (34) is provided for initiating an inspection of the switching states of the components, and in that after the initiation these switching states and/or the changes



thereof are indicated on the display device (1).

12. Device according to one or more of the preceding claims, which, as a centrally arranged device of the printing machine, is designed in such a way that at
5 individual components of the printing machines, such as paper feed, paper delivery, printing unit etc., there is provided in each case at least one decentralised control and display device.
13. Device according to Claim 12 which, as a cen-
10 trally arranged device of the printing machine, is designed in such a way that a control of specific components, which takes place by means of the decentralised control device, acts on the centrally arranged device.
14. Device according to one or more of the preceding
15 claims which, as a centrally arranged device of the printing machine, is designed in such a way that inputs on an ink and/or register control console act on the centrally arranged device, or that inputs on the
20 centrally arranged device act on the ink and/or register control console.